

**COOKING STOVE INCLUDING INVERTIBLE SUPPORT RACK, SUPPORT RACK  
WITH DUAL COOKING SURFACES, AND METHODS OF USING SAME**

**BACKGROUND OF THE INVENTION**

**1. Field of the invention**

The present invention relates to cooking stoves and to methods of using same. More particularly, the present invention relates to a gas stove including an invertible support rack, to an invertible support rack with dual cooking surfaces, and to methods of using the described stove and support rack.

**2. Description of the Background Art**

Gas-fired grills and stoves are widely used in the fields of residential and commercial cooking. In particular, outdoor gas grills, using compressed gaseous fuel such as propane, LPG or LNG are commercially available, and are commonly used for barbecue-style cooking.

A conventional outdoor gas grill generally includes a burner element positioned beneath heat-tolerant lava rocks or briquettes, and a grate or grilling surface, positioned above the burner assembly and briquettes. Aside from their general construction, the previously known outdoor gas grills can differ significantly in size, and can also differ as to what options a particular outdoor grill may include.

By way of example, an outdoor grilling apparatus may be stationary with removable grilling units (U.S. patent 5,632,265), portable, incorporating swing-out food and briquette grates (U.S. patent 4,862,792), or may include a height-adjustable work shelf attached to a main grill body (U.S. patent 5,104,080).

Additionally, some of the known outdoor gas stoveing apparatus may be equipped with a

burner unit and associated support rack, similar to that of a kitchen range/cooktop, capable of cooking or warming food in a cooking utensil, such as a pot or pan.

Several variants of outdoor gas grills, incorporating at least one burner unit, are illustrated in U.S. patent numbers 4,886,045, 6,067,978 and 6,192,878.

Additional examples of known outdoor cooking stoves include U.S. patent numbers 2,825,325, 4,726,350, 4,759,339, 5,979,431, and 6,131,561.

Other examples of stoves, burners and adapters particularly designed for use with woks include those disclosed in U.S. patent numbers D265,882, D463,215, 4,062,341, 4,313,416, 4,530,345, 4,607,613, 5,158,067, 5,558,008, and 6,189,530.

Although the known devices have some utility for their intended purposes, a need still exists in the art for an improved stove and vessel support rack which can be adapted to support cooking utensils having different shapes. In particular, there is a need for an improved cooking stove and vessel support rack which can be adapted to alternately support flat-bottomed cooking pans and woks with rounded bases.

## **SUMMARY OF THE INVENTION**

In a first aspect thereof, the present invention provides a stove which can be adapted to alternately support flat-bottomed cooking pans and woks with rounded bases.

In a second aspect thereof, the present invention provides an invertible vessel support rack including dual cooking surfaces.

An embodiment of a stove according to the first aspect includes a hollow shell formed from heat-tolerant material, and a substructure for supporting the shell. The stove also includes a burner assembly, operatively attached to the shell or to the substructure, and a vessel support rack for engaging placement on the shell. At least part of the burner assembly is disposed inside of the

shell.

The vessel support rack is formed from a plurality of interconnected segments. A first vessel-supporting surface is defined on a first side of the support rack, for supporting a cooking vessel having a substantially flat lower surface. A second vessel-supporting surface is defined on a second side of the support rack, for supporting a cooking vessel having a substantially non-flat lower surface. The second vessel-supporting surface may be configured to support a substantially concave cooking implement, such as a wok thereon. The shell is configured to receive the support rack thereon with either the first vessel-supporting surface or the second vessel-supporting surface facing upwardly.

Accordingly, it is an object of the present invention to provide an outdoor stove apparatus including an invertible grill, which can be arranged to support either a flat-bottomed cooking pan or a wok.

It is another object of the present invention to provide an invertible support rack having different vessel-supporting surfaces on two sides thereof.

For a more complete understanding of the present invention, the reader is referred to the following detailed description section, which should be read in conjunction with the accompanying drawings. Throughout the following detailed description and in the drawings, like numbers refer to like parts.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a perspective view of an outdoor gas stove according to a selected illustrative embodiment of the present invention, shown with a compressed fuel storage tank;

Figure 2 is a side plan view of the gas stove of Figure 1, shown without the fuel tank and with a supply hose partially cut away;

Figure 3 an elevated perspective view of the gas stove of Figure 1, showing a vessel support rack thereon with a flat side thereof oriented facing upwardly;

Figure 4 is a perspective view similar to Figure 3, showing a user beginning to invert the support rack;

Figure 5 is a perspective view similar to Figure 4, showing a user further rotating the support rack;

Figure 6 is a perspective view similar to Figure 4, showing the support rack fully inverted and with a curved side thereof facing upwardly;

Figure 7 is a detail view of the gas stove of Figures 1-6, showing the support rack in the process of being lifted away from alignment with the shell;

Figure 8

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring now to the drawings, a gas stove apparatus for outdoor use, in accordance with a first illustrative embodiment of the present invention, is shown generally at 10, along with a compressed fuel tank 11.

The stove 10 includes a hollow shell 12 formed from heat-tolerant material, and a substructure 14 for supporting the shell. The stove 10 also includes a burner assembly 16, operatively attached to the shell or to the substructure, and a vessel support rack 50 for stable placement on the shell 12. The burner assembly 16 may be substantially as described in the disclosure of U.S. patent application 10/165,607, filed June 7, 2002. The disclosure of U.S. patent application 10/165,607 is hereby incorporated by reference, along with the drawings thereof.

### The Shell

The shell 12 may be formed from stamped sheet metal, which may be coated with a ceramic material for durability. The shell 12 has a burner access hole 13 formed therein to accommodate a portion of the burner assembly 16.

The shell 12 may also have a plurality of vent holes 15 formed therein to admit combustion air. The arrangement and number of these vent holes 15 is important, to admit enough air to ensure a good air/fuel ratio for efficient combustion of the fuel.

In the depicted embodiment, the shell 12 also has a plurality of alignment slots 17 formed therein to receive alignment tabs of the vessel support rack 50.

Referring now to Figures 3A-3B, the shell 12, in the depicted embodiment, has a substantially circular outline as viewed from above, and has a rolled bead 18 extending around the outer edge thereof for strength and reinforcement. The shell 12 has a substantially vertical upper side wall portion 20 extending downwardly from the rolled bead 18, and extends inwardly from the bottom of the side wall portion 20 to form a substantially horizontal upper ledge 22, which is provided for supporting the vessel support rack 50 thereon. As seen in Figure 3A, the alignment slots 17 are formed in the ledge 22 part of the shell 12. The alignment slots 17 provide a plurality of alignment connectors for receiving mating connectors of the vessel support rack 50.

The shell 12 extends downwardly from the inner edge of the ledge 22 to form a spacer section 24, for spacing the support rack 50 away from the burner assembly 16. The spacer section 24 may have a plurality of spaced-apart vent holes 15 formed therein, as shown. At the bottom of the spacer section 24, the shell 12 extends inwardly again and then tapers in and down to form a substantially bowl-shaped burner housing 26. The burner access hole 13 is formed in the side of

the burner housing 26, to allow an inlet end of the burner 16 to extend outwardly from the shell 12, as shown in Figure 2. The burner housing 26, in turn, may also have a plurality of vent holes 19 formed therein to admit combustion air. At the base of the burner housing 26, a floor 27 extends across the bottom of the shell 12.

### The Substructure

The substructure 14 is provided to elevate and support the shell 12. In the embodiment of Figures 1-2, the substructure 14 is made up of a plurality of height-adjustable legs 30, which are affixed to the shell 12 by welding or by the use of fasteners 32 (Figure 4) such as nuts and bolts. Alternatively, the substructure 14 may be provided in the form of a cabinet 34 (Figure 5), which may optionally include a height-adjustable jack 35. The jack may be used to lower the shell 12 and burner 16 to a recessed position as shown in Figure 5B, to accommodate a large cooking pot P. An example of a cabinet which may be used is shown and described in U.S. patent application serial no. 09/971,866, filed October 5, 2001. The disclosure of U.S. patent application 09/971,866 is hereby incorporated by reference, along with the drawings thereof.

### The Support rack

The support rack 50 is formed from a plurality of interconnected segments. In the depicted embodiment, the support rack includes a plurality of stamped metal rack brackets 52 interconnected by inner and outer rings 53, 54, respectively. As shown in Figure 6, each of the rack brackets 52 has a main body portion 55 which is roughly triangular in shape, with a narrow inner end 56 and a wider outer end 57. The main body portion 55 of the bracket 52 has a first side edge 58 which is substantially flattened, and a second side edge 59 which is substantially curved. Optionally, a substantially triangular cutout 60 may be formed in the bracket 52, as

shown, and the inner ring 53 may pass through the cutout 60, as shown in Figure 4.

Each rack bracket 52 also includes an extension 62 extending outwardly from the outer end 57 of the main body portion 55, with respective first and second integral tabs 63, 64 extending vertically in opposite directions thereon. The extension 62 may also have a through hole 65 formed therethrough, as shown, and the outer ring 54 may extend through the through holes 65 of each of the rack brackets 52, to help link the brackets together to form the overall vessel support rack 50.

Referring now to Figures 7A-7B, it will be seen by orienting the vessel support rack 50 with the flat side edges 58 of the brackets 52 facing upwardly, and by placing the second tabs 64 of the rack brackets into the alignment slots 17 of the shell 12, that a first, substantially flat vessel-supporting surface 70 is defined on a first side of the support rack. The first vessel-supporting surface 70 is provided for supporting a cooking vessel having a substantially flat lower surface, such as the cooking pot P shown in Figure 5B.

Conversely, the vessel support rack may be inverted as shown in Figures 8A-8D. By orienting the vessel support rack 50 with the curved side edges 59 of the brackets 52 facing upwardly, and by placing the first tabs 63 of the rack brackets into the alignment slots 17 of the shell 12, a second, substantially bowl-shaped vessel-supporting surface 72 is defined on a second side of the support rack. The second vessel-supporting surface is provided for supporting a cooking vessel having a substantially rounded lower surface, particularly a wok.

The shell 12 is configured to support the vessel support rack 50 thereon with either the first vessel-supporting surface 70 or the second vessel-supporting surface 72 facing upwardly.

Although the present invention has been described herein with respect to a limited number of presently preferred embodiments, the foregoing description is intended to be illustrative, and not restrictive. Those skilled in the art will realize that many modifications of the preferred embodiment could be made which would be operable. All such modifications, which are within the scope of the claims, are intended to be within the scope and spirit of the present invention.